

## CLASSIFYING GAUGE VACUUM FEEDER

It is related to an equipment to transport and move material, which transfers products in bulk one by one; it receives a certain amount of pieces and delivers one by one to the next industrial process. In the food industry for example a certain amount of  
5 boneless chicken breast fillets transported on a belt conveyor are put over a scale one piece at the time.

Solid products of rigid material having a settled geometrical form such as a box, are separated from the continuous flow of a belt conveyor with the help of a mechanical deviator like a hurdle plate, pneumatic or hydraulic piston. A cylinder is also used with  
10 dragging plates on the cylinder surface: when the cylinder turns around the solid products that come all together are moved one by one by the plates. So, the products that come all together to the cylinder come out one by one. Equipments which use mechanical processes as the one mentioned above simply don't work when the product is flaccid, without a defined shape as the boneless chicken breast fillet, fish fillet, chicken wings and other.

15 In the paper industry the cellulose fibers flow on a water stream and then a layer of fibers sticks to a cylinder surface. This cylinder surface is perforated, like a net, and a vacuum is made inside the cylinder in a way that the fiber layer of cellulose sticks to it by suction; after almost a complete turn the fibers, now in a paper form, are disconnected from the cylinder. This suction system on a cylinder-turning surface is also used in the  
20 printing industry when there is a need to turn the side of the paper sheet that is on the conveyor. The paper sheet covers the cylindrical surface which sucks it; the paper sheet sticks to and stands close to the cylindrical surface while turning in an angle of approximately 360 degrees when the suction force is interrupted and the paper sheet disconnects from the cylinder and falls over another conveyor.

The equipment hereby described uses the vacuum system on a cylindrical surface of a cylinder to catch item by item from a certain amount of flaccid products and from there put them on top of a tray for individual weighing. The equipment is a transfer device from a transport means to another transport means or to a weighing system. The cylindrical surface of the cylinder has holes, which communicate with a vacuum pump. Using an arrangement as described such items may be gripped individually by the cylinder e.g. the suction hole(s) of the cylinder, transported to another location, e.g. a conveyor band or the like, and released for further processing, transport etc. In this manner the delivered items will be placed individually and for example with a minimum distance between the items on a conveyor band. Even further, the arrangement may serve to even out a flow of items being delivered.

The flaccid items arrive through a conveyor and are accumulated next to the cylindrical surface and each hole sucks one piece; this piece is transported along the rotating cylinder on a distance smaller than the cylinder turn and when the suction is interrupted on this hole the piece falls over the weighing belt. The number of holes as well as their diameter and positioning on the cylinder surface are determined according to the product to be transported: its seize, weight and flabbiness degree. The rotation speed adjustment of the cylinder enables to catch and send approximately 50 to 180 pieces per minute one by one to the weighing unit. The inventive act is centered on the use of holes on the cylindrical surface that catches individually by suction solid pieces and flaccid material.

Also, it is noted that the apparatus according to the invention may be utilized for handling items that may differ in size, shape, weight etc. from each other.

Figure 1 shows schematically the flow of pieces(1) transported by a conveyor(2) and accumulating (3) next to the cylindrical surface of cylinder(5) where they are caught

(4) and carried by the rotating cylinder(5). They are released and fall (6) over a belt(7) of the weighing scale(8).

Figure 2 shows the existing holes(9) on the cylindrical surface of cylinder(5) connected by internal tubes(10) to the side holes(11).

5 Figure 3 shows an internal side flange(12) with an arc of holes(13) surrounded by a sealing joint(16).

Figure 4 shows an external side flange(14) with a vacuum distribution chamber(15) and the suction tube(17) that is connected to the vacuum pump, not shown.

10 Figure 5 is cylinder(5) perspective cut view showing the internal tubes(10) which connect the existing holes(9) on the cylindrical surface and the existing holes(11) on the surface of one of the bases of the cylinder(5).

The figure 6 shows schematically another embodiment to transport the pieces(1) by means of belt(2) now placed under the cylinder(5) surface when they are caught (4) and carried by the rotating cylinder(5). They are released and fall (6) over a belt(7) of the weighing scale(8). The pieces (18) which were not caught by the cylinder(5) continue their way on belt(2) to discharged point(19) in order to be replaced on the belt(2).

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The figure 7 shows different types of sockets(20 to 24) which are connected to the holes(9).

The vacuum generated by the vacuum pump, not shown on the drawings, follows by a tube(17), reaches the holes(13) on the internal side flange(12) through the distribution chamber(15) on the external side flange(14) lined up with the existing holes(13) on the internal side of flange(12). With the help of a sealing joint(16) the vacuum is transmitted through the existing holes(11) on the surface of one of the bases of the cylinder(5) until it reaches the existing holes(9) on the cylindrical surface of cylinder(5). To the existing

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holes(9) on the cylindrical surface are coupled sockets with nozzles having geometrical shape and size according to the material characteristics which is being transported.

The flaccid pieces(1) have substantially similar size and weight; they are transported through a belt(2) until next to the cylindrical surface of cylinder(5); by suction the pieces(1) stick to holes(9) on the rotating cylindrical surface; after a 120 to 210 degree turn the vacuum action on holes(9) is interrupted and the pieces(1) are disconnected one by one from the cylinder(5) and fall over a belt(7) than being transported until they pass over a weighing cell that weighs item(6) by item(6) and grades the items to packing and storing. The holes (9) have sockets( 20 to 24) with a proper geometric form for each type of product to be transported. The sockets have a form of a cylinder body with an axial cylindrical hole in which the base in contact with the product has different nozzle shapes such as of an elliptical cross-section(20), of a normal cross-section(21), of a hollow truncated cone(22), of a ring type cylindrical body boss(23), or of a rectangle(24).

Finally, it is noted that the apparatus may comprise one cylinder for transporting items, which cylinder may be designed for handling items e.g. in parallel, e.g. handling items in two or more lanes or tracks. It is also noted that the holes in the surface of the cylinder are placed in such a manner that only one item is picked up at a time for each track or line of items being handled.